Chapter 2
From Thing to Relation. On Bateson's Bioanthropology

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Abstract The rapid increase in our technological mastering of more and more intimate and everyday aspects of life has created an acute sensitivity towards the huge lacunas left over by rational knowledge and technology. The present "turn towards the spiritual" has probably very much to do with such feelings of disturbance. From a Batesonean view the roots of these lacunae are to be found in fundamental epistemological errors in the preferred schemes of conceptualizations in western culture – a never decently surmounted dualism one might perhaps say. One central point here is the persistent reification of *relation*. Relations come in many kinds, but science invariably treats relations as dependent variables, dependent that is on *things*. Giving primacy to process and relation over things Bateson implicitly cleared the way for a semiotic kind of final causation, which however he would perhaps not himself have accepted, because his understanding of final causation implied an inversed – and totally contra factual – temporal ordering. The very systemic characteristics he found in aesthetics in natural systems seems however to point the way to other possibilities for understanding final causation. Possibilities which can be made fruitful in a biosemiotic reframing of technological challenges as well as in our feelings of belonging in a big "pattern that connects".

Keywords Relative being, semiotic freedom, intentionality, semiotic causation, emergence

A Deep Symmetry

One reason why Gregory Bateson's thinking never did find the broad audience it deserved may be that he very explicitly placed himself in a position few people are prepared to consider possible. Bateson's ideas hit a strange blind spot in western thinking.

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On the one hand we have a scientific approach to the study of life that takes for granted that natural laws exhaustively explain all of reality. On the other hand we have a humanistic approach to which human intentionality, conscience or "first person experiences" remain central and which maintains that the core of these phenomena evades description in terms of natural laws. Thinkers of the latter opinion often take the poverty of the scientific world view *vis-à-vis* these aspects of the world to imply that a religious or spiritual position is necessary. Conversely, and symmetrically, adherents of the scientific world view routinely suspects religious or spiritual motives behind any criticism of the scientific world view.

None of these mainstream views seems much inclined to consider that a third possibility exists, a position that sees human mind as a particular instantiation of a nature that is in a deep sense itself *minded*. A view, in other words, which holds that neither human mind nor nature at large is reducible to deterministic natural laws. According to this third position, the position taken by Bateson and before him by Charles S. Peirce – let us term it *the bioanthropological position* – nature is not the mindless kind of thing the natural sciences have stubbornly tried to reduce it to and there is therefore no reason why human mind should not be seen as a naturalistic phenomenon in no particular need of religious or spiritual explanation.

Bateson's choice of a living place in the final years of his life – in Esalen, a spiritual centre for the counterculture of the 1970s north of San Francisco – may seem strange for a man who had dedicated so much of his life to the world of science, but as he himself explained in "Angels fear" he did not feel comfortable with the value systems and manners of scientific culture:

> I am appalled by my scientific colleagues, and while I disbelieve almost everything that is believed by the counterculture, I find it more comfortable to live with that disbelief than with the dehumanizing disgust and horror that conventional occidental themes and ways of life inspires in me (Bateson and Bateson 1987, 52).

Bateson very explicitly rejected the sorts of miraculous events believed in by the counterculture of Esalen:

> The trouble is that belief in a claimed miracle must always leave the believer open to *all* belief. By accepting two contradictory kinds of explanation (both the ordered and the supernatural), he sacrifices all criteria of the incredible. If some proposition is both true and false, then *all* propositions whatsoever are and *must* be both true and false. All questions of belief or doubt then become meaningless (*ibid*, 54).

But he also saw that superstition and materialism were in a strange way symmetrical beliefs:

> Miracles are dreams or imagenings whereby materialists hope to escape from their materialism. They are narratives that precisely – too precisely – confront the premise of lineal causality (*ibid*, 51)

Materialism and supernaturalism are in Bateson's view logically opposite ways of responding to the same central misconceptions deeply buried in our Cartesian heritage. First and foremost the idea that there are two distinct explanatory principles in our world, "mind" and "matter", forcing us to chose beetween the causality of mind (supernaturalism) or the causality of matter (materialism) in our explanations.

This primary error became reinforced by another idea also introduced by Descartes, the idea of using intersecting coordinates to represent two or more interacting variables or represent the course of one variable over time. This idea has of course been extremely successfull and it is indeed hard to imagine scientific knowledge without it. Cartesian coordinates constitute the very fundament for analytical geometry and thereby for the calculus of infinitesimals and the scientific emphasis on *quantity*. There is of course nothing wrong about using coordinates to describe material phenomena in our world. But the very success of this procedure may have blinded scientists to its shortcomings. Phenomena such as contrast, frequency, symmetry, correspondence, relation, congruence and conformity are not easily described in terms of quantities if at all – they are, as Bateson noted, variables of zero dimensions and cannot be located (Bateson 1972, 408) – and yet all communicative processes in nature depend upon discontinuities of this kind. Bateson writes:

> The two ideas are intimately related. And the relation between them is most clearly seen when we think of the mind/matter dualism as a device for removing one half of the problem for explanation from that other half which could more easily be explained. Once separated, mental phenomena could be ignored. This act of subtraction, of course, left the half that could be explained as excessively materialistic, while the other half became totally supernatural. Raw edges have been left on both sides and materalistic science has concealed this wound by generating its own set of superstitions. The materialist superstition is the belief (not usually stated) that quantity (a purely material notion) can determine pattern. On the other side, the antimaterialist claims the power of mind over matter. That quantity can determine pattern is the precise complement for the power of mind over matter, and both are nonsense (ibid, 59).

To illustrate this claim Bateson asks the reader to consider the relation between classes and things. Take for instance chlorine, which is a name for a *class* of molecules but is not itself *a* molecule or a thing. Now, if you mix chlorine and sodium a chemical reaction will take place leading to the formation of common salt. Nobody denies the truthfulness of this statement. The problem is that the statement is not directly about the material world but only about *classes* of molecules. So, the question is: are there such things as *classes* in the material world?

Bateson's answer to this question is surprising, and may not be understandable at all inside the Cartesian framework where causative agents are always positive events or conditions: impacts, forces and so on. As Bateson notes, this is not so in the creatural world (on the *pleroma–creatura* distinction, see next paragraph), where effects are caused by *differences* in some parameter sensed by the organism. A telling example is that of the frog which will not see an insect sitting right in front of it as long as the bug doesn't move. The moment it moves, however, the frog immediately sees it and probably catch it too (Lettvin, Maturana et al. 1959). "Every effective difference" says Bateson "denotes a demarcation, a line of classification" (Bateson 1972, 457). Classifications then are indeed natural phenomena, but only in *creatua* not in *pleroma* (note 1). This answer does in a way lay out much of the epistemological fundament for what should later become biosemiotics (a term Bateson never used himself of course):

> In the world of living things, the Creatura of Jung and the Gnostics, there are really classes. Insofar as living things contain communication, and insofar as they are, as we say, "organized",

> they must contain something of the nature of message, events that travel within the living thing or between one living thing and others. And in the world of communication, there must necessarily be categories and classes and similar devices. But these devices do not correspond to the physical causes by which the materialist accounts for events. There are no messages or classes in the prebiological universe.
>
> Materialism is a set of descriptive propositions referring to a universe in which there are no descriptive propositions (*ibid* 61–62).

Thus the life sphere is characterized by proccesses of communication, or semiosis as we would say today, and this is where patterns belong. But the causative universe of materialistic science does not possess the apropriate tools for describing such processes.

The misunderstanding that quantity determines pattern owes much of its credibility to the apparent naturalism of the Cartesian coordinates, which tended to conceal the constructed nature of any graphic or functional representation of natural processes. The laws of gravity, for instance, do persuasively describe certain aspects of our world, but this does not mean that the laws are natural in the sense that they are part of nature. The laws are patterns made up by scientists, they are mental phenomena. Patterns don't exist unless *somebody* draws them.

And here is the core of Bateson's idea, a far-reaching idea indeed: living systems are communicative systems by themselves, and they must therefore deal with classes of some sort, or, in other words, they draw patterns and – I would add – in this sense they essentially are *somebodies*. Consequently somebodies – ourselves included – are natural beings, not supernatural observers describing the world "from nowhere" (to use Thomas Nagels incisive expression (Nagel 1986)).

Creatura and Pleroma

This brings us directly to what I think may be called the main focus of Bateson's whole work wether in biology or in athropology, understanding the process of knowing, or epistemology: "the interaction of the capacity to respond to differences, on the one hand, with the material world in which those differences somehow originate, on the other". Or, expressed in the terminology Bateson chose for his discussion in *Angels fear*: the interfaces between *Pleroma* and *Creatura* (Bateson and Bateson 1987, 20) (note 2).

Pleroma is the world of nonliving matter. This is the world descibed by physics and chemistry in which there are no descriptions. A stone does not respond to information and makes no injunctions. The stone is affected by "forces" and "impacts", but not by difference:

> I can describe the stone, but it can describe nothing. I can use the stone as a signal – perhaps a landmark. But *it* is not the landmark. I can give the stone a name; I can distinguish it from other stones. But it is not its name and it cannot distinguish. It uses and contains no information."It" is not even an *it*, except insofar as I distinguish it from the reminder of inanimate matter (*ibid*, 17).

Creatura on the other hand is "the world of explanation in which the very phenomena to be described are among themselves governed and determined by difference, distinction, and information" (*ibid*, 18). *Angels fear* was published in 1987, seven years after Gregory Bateson's death, and his daughter, Mary Catherine Bateson, who had worked closely together with him in writing the book before his fatal disease would bring his life to an end, took care to point out in brackets that Creatura and Pleroma are not, like Descartes' "mind" and "matter", separate substances:

> On the one hand all of Creatura exists within and through Pleroma; The use of the term Creatura affirms the presence of certain organizational and communicational characteristics which are themselves not material. On the other hand knowledge of Pleroma exists only in Creatura. We can meet the two only in combination, never separately. The laws of physics and chemistry are by no means irrelevant to the Creatura – they continue to apply – but they are not sufficient for explanation (*ibid*, 18).

The Creatura–Pleroma distinction is indeed quite subtle, and from Bateson's unpublished manuscripts it appears that he had worked on it for quite some time (Harries-Jones 1995, 95–97). In *Angels fear* Bateson explicitly accepts the Kantian understanding of *Das Ding an Sich* as an inaccessible, and accordingly he also thought that we can only know the non-living material universe of *pleroma* through the communicative contexts we ourselves establish, the appearances of *pleroma* so to say, not *pleroma* itself. Harries-Jones explains: "As *creatura*, we may assume that *pleroma* has its own regularities – inertia and change, cause and effect, connection and disconnection – but the regularities of *pleroma* remain, in the last resort, inaccessible directly" (*ibid*, 97).

The creatural theory is probably the nearest thing Bateson ever came to formulating the ontological assumptions underlying his scientific work. Reading it again so many years later, and this time with an eye to the Peircean perspectives of his thinking I found it hard not to equate *creatura* more or less directly with Peircean *thirdness. Creatura*, like *thirdness*, is an anlytical tool for ordering the world's phenomena into categories, and more concretely *creatura* and *thirdness* both encompasses the mediating, lawful and evolutionary aspects of our world. To place *pleroma* in the Peircean categorical system is less obvious. Taken in its Jungian sense from *Septem Sermones ad Mortuos* as the totally unstructured realm, the "nothingness" or the "fullness" of the eternal or infinite, *pleroma* might perhaps be equalled to Peircean *firstness*, i.e., potentiality, indeterminacy or chance. As examples of *firstnes* Peirce gives the smell of rotten cabbage or the scent of a rose, but also the instantanious feel for a mathematical proof or a melody. *Firstness* necessarily is vague because it is pure quality and doesn't imply a referent. Think of blueness as such, i.e. without fixing the color to any blue object. Again *firstness* – like *pleroma* – need to manifest itself in order to be grasped, but the moment it manifests itself it is already embraced by *secondness*, i.e. reaction, resistance, existence or quantity. *Pleroma* like *firstness* can only be cogitized through its appearences in our cognitive system, so *pleroma* might perhaps be said to correspond to *firstness* in its being in itself, but to *secondness* to the extent pleromatic phenomena are distinguished and described theoretically or practically.

Peirce's categorical system needed three and only three categories corresponding to the logical distinctions between predicate (*firstness*), subject (*secondness*) and copula (*thirdness*). Bateson also, according to Harries-Jones, like Jung, recognized that the drawing of a distinction such as *creatura* in the middle of the supposed unity of *pleroma* would logically require a "third position" from which this distinction could itself be viewed. This led Jung to the idea of the mystic gnostic figure of God Abraxas, who is a level higher than the opposed qualities of unity and distinctiveness. Bateson, however, did not follow Jung very far along this track, preferring to see *creatura* and *pleroma* as explanatory principles rather than ontological categories. This was a fortunate choice I suppose, but it must also be admitted that it leaves the Batesonian system a little naked. One would like to escape the implicit dualism of *pleroma* and *creature* not only by epistemizing the two terms. For this distinction does indeed seem to confer upon us a deep sense of understanding – and not just a tool for obtaining such understanding. Let me suggest that a solution to Bateson's dilemma at this point might be to give up the Kantian idea of the inaccessibility of the world's *pleromatic* existence

Peirce did not accept the idea of the thing-in-itself as an unapproachable limit concept for our understanding. He rather, as John Deely explains, saw "the realm of what exists 'in itself' and what exists 'phenomenally' or 'in appearances' " as "laced together, in fact, in experience and in cognition as such, by the action of signs in such a way that we can come to distinguish and know the one as part of the other by the critical control of objectivity that is the heart of science and philosophy alike beyond their differences of orientation" (Deely 2001, 613–14). Peirce escapes the Kantian deadend of modern philosophy exactly because he does not follow modern philosophy in thinking that thought operates with concepts or ideas, claiming instead that thought operates on *signs*. This difference is radical: concepts refer, signs signify. Signs are neither sensible things nor concepts, they are pure *relations*, i.e., irreducibly triadic relations connecting a sign vehicle to its object through the production of an interpretant; and this triadic relation is itself independent of the concrete physical status of the sign vehicles, the objects to which they might refer or the source from which they derive, be it nature or mind.

Thus, according to Peirce, Bateson's *pleroma* would not be inaccessible, but would as the subject matter for physics and chemistry gradually become better and better known to mankind as that primary substratum of the universe out of which life and human mind had gradually emerged. How this could happen is exactly what science and philosophy should now work together to solve. Some beginnings in this direction can be found (Pattee 1977; Salthe 1993; Weber 1998; Hoffmeyer 1999; Kauffman 2000; Hoffmeyer 2001; Deacon forthcoming). And in this sense the existence of *creatura* would not presuppose some mystical "third position" from which to distinguish it from mindless *pleroma*, Rather the distinction of *creatura* from *pleroma* should be seen as an in-built possibility inherent to our universe only to become fully realized through the unfolding of the sharpened evolutionary potential of *creatura*.

Relative Being

The interface between *pleroma* and *creatura* cannot be dealt with in classical biology for the simple reason that *creatura* or *thirdness* refers to aspects of the natural world that fall beyond the accepted ontology of natural science, and all attempts at explaining these concepts are therefore likely to be met with suspicions of mysticism. Even though most biologists do probably recognize that communicative processes are part of natural systems, they instinctively figure these processes in terms of the involved biochemical and genetic processes supposed to result in the communicative behaviors. To talk of messages or distinctions just blurs our minds. This is the reductionist credo ruling nearly every department of biology throughout the whole world. And the simple question asked from these quarters when confronted with Bateson's writings (or biosemiotics) normally is: what's all the mess about?

What it is all about, I think, is a quite simple thing, namely the reality of *relative being*. Relative being is a strangely obvious thing, which is nevertheless generally dismissed by science as not really "real". For example Jupiter has a number of moons circling around it; but the relation between the moons and the planet is not seen as anything real in itself, it doesn't add anything to a strict analysis of the properties of the individual celestial bodies themselves. The simple genitive case seems neatly to exhaust the whole relation: the moons are indeed Jupiter's. And it is of course true that in principle a relation could be drawn between any two physical objects in the world, and in all but a very few cases such relations would turn out to be absolutely uninteresting, whether seen from the point of view of science or from the point of view of ordinary people's everyday life. However, not all relations are of this kind; and to give an example of "relative being" which cannot easily be dismissed as ficticious let me suggest "parenthood". For all we know king Frederik the Ninth of Denmark was the father of Queen Margrethe the Second, though His Majesty passed away a long time ago, and we have no doubt that Margrethe will pass away too at some time in the future. Yet, due to royal destiny their relation will in all likelihood persist for a very long time as a relation of parenthood, father to daughter. This kind of "relative being" seems to have a reality of its own which cannot be reduced to the individual persons that substantiates the relation, and such relations have been called *ontological relations* (Deely 1990; Deely 1994; Deely 2001).

But are there ontological relations in nature? Bateson's work can be interpreted to answer this question in the affirmative. *Creatura* is exactly the domain of *pleroma* where relations are truly ontological, in the sense that these relations are not just descriptive devices but are in fact functional in an autonomous way. Relations in *pleroma* may also sometimes be thought of as functional, as for instance in astrology. Thus the multiple relations existing between the planets of our own solar system has indeed been intensely studied by scientists of the past, and they remain a matter of great concern to a lot of people believing in varieties of astrological theory. Since no likely mechanism whereby, say, a conjunction between Mars and Venus (as seen from Earth) could possibly influence the destiny of individuals

or nations on Earth has been suggested, such a belief is generally rejected by scientists as superstition. We have absolutely no reason to believe that those relations have any distant causal effects on the world qua relations. In this case – as in *pleroma* in general – it makes good sense to talk about related things rather than relations, and maybe the general unwillingness of science to accept relations as ontologically real owes much of its strength to the ancient – and now strangely revived – struggles science had to fight against dogmatic beliefs connected to mystical or religious persuasions.

When we turn to *creatura*, however, relations tend to become considerably more autonomous things. The shoulder, for instance, is a ball-and-socket joint that enables a person to raise, twist, bend, and move the arms forward, to the sides and behind. The head of the upper arm bone (humerus) is the ball and a circular depression (glenoid) in the shoulder bone (scapula) is the socket. A soft-tissue rim (labrum) surrounds and deepens the socket. The head of the upper arm bone is coated with a smooth, durable covering (articular cartilage) and the joint has a thin, inner lining (synovium) for smooth movement. The surrounding muscles and tendons provide stability and support. Here are a whole assembly of relations which are all remarkably adjusted to each other. The primary functional relation of course is that between the shape of the ball of the arm bone and the contour of the shoulder socket, and we can assume that this relation has indeed been functionally modulated by natural selection all along the way from the evolutionary origin as appendages or fins in fish. Clearly these relations are of quite another kind than the pleromatic relations pertaining to the planetary system. The relation in fact is so central to the function of the animal that one can hardly imagine the one bone change without a corresponding change occurring in the other bone. Or, if this should happen by an unfortunate mutation, the resulting individual would be crippled and leave little or no offspring. If on the other hand, a mutation should occur that affected both bones in a coordinated way, conserving their internal relation, the resulting individual might perhaps manage quite well in the competition. In this case, the relation as such does indeed seem more real than the individual bones making up the relation. And this state of affairs may well be the rule rather than the exception in the realm of *creatura*.

Quite generally, living systems have evolved a capacity for making anticipations: they must decide when to grow and when to withhold growth, when to move, when to hide, when to sing, and so on, and this way of adjusting the behavior depends on a capacity to predict the future at least to some limited extent. For instance: is it likely the sun will shine or not, is it likely that little flies will pass by if I make my web here, will the predator be fooled away from the nest if I pretend to have a broken wing etc. Of course, in most cases it will be the instinctual system of the animal rather than the brain that makes this kind of prediction, but the logic is the same: the animal profits from its ability (whether acquired through phylogeny or through ontogeny) to identify trustworthy regularities in the surroundings. And most – if not all – trustworthy regularities are indeed relations. For instance, the relation between length of daylight and the approaching springtime that tells the beech when to burst into leafs; or the play of sun and shadows which tells the spider where to construct its web; or the relation between clumsy movements and an easy

catch that tells the predator which individual prey animal to select, and thus tells the bird how to fool the predator away from its nest.

Now, in the first two of these examples (the beech and the spider) a certain organismic activity is released as a response to pure (non-semiotic) natural relations, so-called *categorical relations*, whereas in the third example the bird produces a fake categorical relation (clumsy behavior as expectedly related to easiness of catch) and then takes advantage of the semiotic or ontological relation established by the predator when it lets itself be fooled by a false sign. In this case, in other words, the bird fools the predator because it somehow (genetically or ontogenetically) 'knows' how the predator is going to (mis)interpret the seeming categorical relation. Observe that, in this case, the predator may not always be fooled, we are not here dealing with normal (efficient) causality, but with semiotic causality: the predator may misinterpret the sign (the faked clumsy behavior), but it also may not.

Anticipation is of course a semiotic activity in which a sign is interpreted as a relation between something occurring now and something expected to occur later, like the dark cloud alarming us to an upcoming thunderstorm. From its very first beginnings in Augustine's writings in the fourth century the sign is conceived as something awakening us to infer something else: In Augustine a *signum* or "a sign is anything perceived which makes something besides itself come into awareness" (quoted from Deely 2001, 221). Deely suggests that Augustine happened on this definition as a "lucky fault" (*ibid*, 216) due to his reluctance to learn the Greek language. The Greek term for sign, semeion, was taken by the Greeks to imply "natural signs", whereas "cultural signs" were termed symbols or names, and this categorization of signs of natural and human origin into distinct groups might well, had he mastered the Greek language, have hindered Augustine from abstracting the formal relational character of the sign from its embeddednes in different concrete realms of reality. Still Augustine's definition is too narrow in its focus on perception, since elements of awareness may well be signs also without being perceived. Augustine nevertheless pointed to the core of the matter when he defined a thing as "what has so far not been made use of to signify something" (*ibid*, 221), implying that things may well be signs but they need not be so, and also implying that the essence of the sign is its formal relational character of evoking an awareness of something which it is not itself, thereby implying the full triad of sign, object and interpretant (here the altered awareness). The evoking of such a triad is of course by no means exclusive for the workings of human awareness but is rather, as was later realized, a purely logical relation to be established in any system capable of autonomous anticipatory activity, i.e., by all systems belonging to *creatura*.

Just as predictability must precede prediction, a system of useful dyadic relations must first have been realized on planet Earth while it cooled down. Only then more sophisticated systems could survive based on a complicated capacity for anticipation that is, for bringing themselves in relation to the pre-established set of relations under the formation of true triadic or semiotic relations. And while the underlying system of dyadic relations may well be understood in terms of the things related, the emergence of true triadic semiosis in the shape of living beings and their activities established kinds of causality peculiar to this new form of *relative*

being, causalities which are way too sophisticated to be decently grasped through the simple dynamics of dyadic relations between things.

Natural selection is also ultimately dependent upon predictability if durable changes shall be produced. If niche conditions in generation$_{n+1}$ were not to some extent like niche conditions in the generation$_{n,}$ "selected" properties in one generation would induce no systematic advantage in the next. In natural selection a relation between the composition of phenotypes in the population or lineage and the actual ecological and semiotic niche conditions framing the life of this population is acted upon by individuals in such a way that a collective quasi-rational "populational" interpretant is the outcome in the form of an altered pool of genomes brought forward to the next generation. Here the niche occupies the logical position of the sign vehicle, the changing composition of phenotypic properties in the population is the object to which those niche conditions refer the lineage, and the interpretant is the changed genome composition of the lineage in the next generation. Through hundreds of millions of years such a mechanism is thought to bring about coordinated adjustments, like the one pertaining to the upper human arm bone and the shoulder socket.

Describing natural selection as a semiotic process implies that the apparent finality (or teleology) of the process becomes non-contradictive. Semiosis or sign action is always embedded in sensible material processes and for that reason has a dynamic side that allows the communicative process to run, as well as a complimentary or mediating side. The first of these sides is governed by the compulsive force of efficient causation; the second expresses the controlling agency of semiotic causation. And semiotic causation, bringing about things under guidance of interpretation in a local context, might be seen as a modern way of conceptualizing the kind of causation Aristotle called final causation, i.e. that cause"for the sake of which" something exists or occurs. Anticipation through skilled interpretation of indicators for temporal relations in a context of a particular survival project (or life strategy) will necessarily guide organismic behavior towards a local end.

Inside materialistic biology, however, the apparent finality of selection remains strangely unaccounted for. Darwinists normally escape the finality-problem by pointing out that selection only exhibits an "as if" teleology, or *teleonomy*. In explaining the purposeful nature of adaptive traits, one does of course make reference to the consequences of those traits for fitness; but, as has often been remarked, the consequences that explain the existence of adaptive traits are the consequences those traits *have had*; they are not the consequences that they *will have* or *can have*. And since the consequences precede the effects, there is no violation of the general scheme of efficient causation implied. And yet, Darwinists all the time talk about properties or types of traits as having been selected for, but the fact that it is not particular "traits" but rather "types of traits" that are selected for does nothing to detract from the obviously teleological nature of the process. At least it must be asked why some *types* of traits are "preferred" by nature (or natural selection) and not other "types". Are not preferences inconsistent with a non-teleological nature?

As Short has recently concluded in a sharp analysis of the finality of Darwinian selection:

> What I am suggesting is that we take seriously the currently popular talk of "selecting for" a property or type of trait (Sober 1984). Taking it seriously means accepting that talk at its face value: it describes evolutionary processes as shaped by types of outcome and it explains outcomes by citing the types those outcomes exemplify. But a type of outcome that explains its own exemplification is what translators of Aristotle have named a "final cause", as Darwin appears to have recognized (Short 2002)

Seen as a semiotic process, the finality of natural selection contains no mystery. Lineages are reproductively integrated systems of individual organisms and as such they certainly interact with the world in pursuing their own supraindividual interests – in fact, to do so would seem to be the whole idea of being equipped with anticipatory capacity.

We conclude that not only is it absurd to deny the reality of *relative being*, because *relative being* rather than things (individual creatures or populations) is what evolution persistently optimizes, but by denying this reality one is prevented from developing a proper scientific understanding of biosemiosis and purposefulness. Instead, science has felt challenged to show that these phenomena are pseudo phenomena (epiphenomena), and that there is therefore no contradiction between our own existence as human first person beings and the purely material universe that created us. People whose intuitions contradict this understanding have had to go elsewhere to cope with their need for understanding how they could possibly belong in this universe. Increasingly natural science has come to look like an esoteric order of believers keeping the reality of non-believers at arms distance behind the walls of power based on a shared narrow ontology (reinforcing itself through the ever repeated memory of the preceding centuries of victorious revolt against the dogma of the Christian church), a consensus about what belongs and what does not belong to reality. How natural scientists manage to know so surely that they are part of a nature that in itself knows nothing is to me a complete mystery.

A Minded Nature

In his book *Mind and Nture* Bateson elaborated an ingenious set of criteria that, if satisfied, would imply that a given system had mind, and he claimed that "the phenomena which we call *thought, evolution, ecology, life, learning*, and the like occur only in systems that satisfy these criteria" (Bateson 1979, 102). The criteria reflected his attempt at synthesising his theory of life with cybernetics and with the theory of logical typing as derived from Russel and Whitehead's *Principia mathematica* (Russel and Whitehead 1910–13). While these criteria have done much to sharpen our dicussions of what should be meant by the term mind, they also in a strange way detract the idea of mind from more classical conceptions of mind as embedded in the subjective intentionality of life. Bateson's criteria may well

explain how mental systems actually do work in cybernetic terms, but the subjectivity of life, the first person experiential world, seems as absent from these criteria as they are absent from the more materialistic models he rightly criticised. This may be because Bateson like Peirce would argue that subjectivity cannot be translated into the individuality of the individual or the choices of ego, a "self" or an "I" (note 3). Indeed, as Harrison-Jones has pointed out: "In anthropology Bateson is regarded as one of the very few early anthropologists who recognized desire and feeling as pertinent to the (then) highly normative discipline of anthropology … I think one has to understand cybernetic criteria in Bateson's writing, not so much as a mechanism of mindedness, but the context within which all "subjectivity" finds "itself" (Harrison-Jones, personal communication). In the Peircean understanding of mind, of course, human mind is just one very particular and concrete instantiation of a principle which is central to our universe as a whole and which, by operating on the sportings of chance, is ultimately responsible for the bifurcations in our universe and for the increasing semiotic freedom and diversification of life on Earth.

In Stuart Kauffman's recent book *Investigations* an important part of the analysis turns on the question of the non-ergodicity of the universe, meaning that the universe never had the time it would have needed should its present state of affairs in any way be representative of its in-built possibilities (Kauffman 2000). The persistent movement of the universe into the "adjacent possible" precludes its ever reaching a state that depends on statistical likelihood. Instead, the universe is historical, for "history enters when the space of the possible that might have been explored is larger, or vastly larger, than what has actually occurred" (p. 152).

And Stuart Kauffman brings his analysis to the following far reaching claim: "our biosphere and any biosphere expands the dimensionality of its adjacent possible, on average, as rapidly as it can" (Kauffman 2000, 151). Kauffman is fully aware that this "burgeoning order of the universe" cannot be reduced to matter alone, to entropy (or the negation of entropy, for that matter), to information, or to anything that simple. The propagation of organization and the subsequent growing diversification of the world is taken care of in Kauffman's terminology by *autonomous agents*, and these agents are, as we shall see, semiotic creatures. An autonomous agent may be defined quite rigorously as an "autocatalytic system able to reproduce and able to perform one or more thermodynamic work cycles"; and in earlier work Kauffman had shown how such agents will be expected to self-organize given the kind of world our Earth system belongs to (Kauffman 1993). In *Investigations*, Kauffman explicitly observes that this definition leads to more intractable questions of "measuring" or "recognition". For if work be defined as "the constrained release of energy", where will the constraints come from? At least it will take work to produce them, and this is not all:

> autonomous agents also do often detect and measure and record displacements of external systems from equilibrium that can be used to extract work, then do extract work, propagating work and constraint construction, from their environment (Kauffman 2000, 110).

and since a measurement is also always an act of interpretation, this immediately brings us to the core of biosemiotics and also poses the question of the origin of life

in a new way which shall not, however, be further explored here (Von Neumann 1966; Pattee 1977; Hoffmeyer and Emmeche 1991; Hoffmeyer 1998; Hoffmeyer 2001; Ulanowicz 2002).

Kauffman's and Bateson's work stands in no contradictory relation to each other here, rather they reach into different aspects of that universal principle which Bateson called mind, and it will be one of the great tasks of biosemiotic analysis to bring these findings under a single consistent theoretical umbrella.

As a first and very preliminary approach to such analysis, let me suggest here that the systematic growth of *semiotic freedom* in our biosphere is a concrete expression of Kauffman's "expanding dimensionality" of "the adjacent possible" as this principle pertains to the Earthly biosphere. Semiotic freedom may in fact be singled out as the only parameter that beyond any doubt has exhibited an increasing tendency throughout the evolutionary process.

Semiotic freedom was introduced in *Signs of Meaning in the Universe* (Hoffmeyer 1996) as a measure for the depth of meaning or the degree of sophistication of communicatory or interpretative activity. Let us for illustration consider first a case of relatively low semiotic freedom: courtship display among water mites of the species *Neumannia papillator*. Here, the male exhibits a behavior called "courtship trembling", in which he will walk slowly around the female in the water vegetation while vibrating his legs. This behavior almost certainly has arisen as an icon for the vibrations produced by prey animals swimming in the surface water. The female will often respond to male leg-trembling as if to prey, orientating itself to the source of the vibration and clutching the male in her forelegs. Male leg-trembling frequencies are well within the range of vibrations produced by the prey (copepods), and starvation experiments have shown that hungry females are more likely to orientate to and clutch at courting males. "It thus appears that male mites are capitalizing on female sensory adaptations for the detection of prey", writes Johnstone (Johnstone 1997). Courtship trembling is an obvious case of what we elsewhere have termed *semethic interaction* (from *semeion* and *ethos* = Greek for, respectively, sign and habit) (Hoffmeyer 1997), i.e., a behavioral interaction between two or more agents in which habits and signs reciprocally scaffold each other. Thus one agent evolves the habit of interpreting the habits of another agent as a sign for releasing a distinct activity or habit that may then, in turn, become signs for a third agent, etc. In *N. papillator*, the prey animal's involuntary vibrations have become incorporated into male courtship behavior as an icon "destined" to release a distinct behavioral pattern in the female, allowing reproduction to take place. Whereas the courtship ritual is thus nicely scaffolded through a semiotic relation, the distinction between the leg-trembling as an icon for prey-behavior and for prey itself is still uncomfortably weak, as witnessed by the fact that hungry females respond more enthusiastically to the icons than do less hungry females.

Biological evolution can only proceed from what is already there, and the creation of "leg-trembling" as a scaffolding device for mating in water mites is typical. The evolutionary process may of course continue to modify the semiotic scaffolding devices it inherits in multiple ways, as may, for instance, be observed in the

evolutionary line of balloon fly species belonging to the family *Empididae*. In these species, Sebeok tells us:

> the males gather in swarms, carrying captured insects as "wedding presents". The male offers his gift to a female, which sits peaceable sucking it out while the male inseminates her. As soon as copulation is completed, the female drops her present, but if the empidid bride is still hungry, she may consume her amorous groom next (Sebeok 1979, 18).

It has been shown that the packaging of these gifts vary greatly from species to species, and in one of the species the male even risks to approach the female "empty-handed". In an early evolutionary stage the female is offered just the juicy insect as such as gift, while in later stages the insect is wrapped in increasingly more silken thread, until the gift has reached the state of a real balloon. In the succeeding stages, writes Sebeok, the prey steadily diminishes in size, hence in food value, while the balloon increases commensurably in complexity (*ibid*, 19). Sebeok notes that in the last of these stages, where the balloon is in fact empty, the link between the sign vehicle and the object for which it stands has become "arbitrary", and that in this case the sign "meets every viable definition of a symbol" (*ibid*, 19). It is interesting that balloon flies are sometimes used to illustrate so-called *phylogenetic inertia*, i.e., the tendency for structures or behavioral features to be conserved within a certain evolutionary line even when there have been significant evolutionary divergences between species. Thus in the balloon fly line even the most recently evolved forms that are nectivorous (eating nectar) still offer balloons as "wedding gifts". In other words the balloon, empty here of course, remains a tool for courtship, even though insects have no longer any concrete meaning to the flies as food objects. Seen from a semiotic point of view this could hardly be called inertia, however, since the passage from an iconic mating sign to a symbolic mating sign constitutes a radical jump in semiotic freedom. All traces of the original dyadic relation have now been erased, and a purely triadic relation has taken over.

In both cases discussed here, as in invertebrates quite generally, I assume (note 4), emiotic freedom is still very limited and should not be seen as a property of single individuals but rather as a property of the species or the evolutionary lineage. The symbolic character of the balloon in nectivorous species of *Empididae* is only true when considered as a species-specific behavioral trait having developed in the lineage as a kind of historical convention. At the level of the single individual fly, on the other hand, there is almost no semiotic freedom at all, since its behavior is fully controlled by the rather deterministic instinctual reflex systems. It should be noticed, however that behavioral determinacy is not complete. Thus, the occasional mutant that, for some reason, has developed a less rigorous release mechanism for mating behavior may, under rare exceptional conditions, survive and thereby contribute to the establishment of a bifurcation of the lineage, a nascent speciation event.

At later stages of evolution semiotic freedom becomes increasingly individualized. One major step in this process is the much celebrated transition from a reptilian world to a mammalian and avian world. Mammalian and avian species in general seem to master significantly more sophisticated ecosemiotic settings than do reptilian

species. The Swedish ethologist Sverre Sjölander has pointed out that while for instance a dog need not have a full picture of the hare all the time for hunting it efficiently, a snake will stop hunting its prey whenever it disappears from view (Sjölander 1995). The snake may well go on searching for the prey at the spot where it disappeared, but it will not calculate the eventual path the prey may have taken. The dog, on the other hand, will proceed away guided by an anticipation of where the hare would be expected to turn up next. "Thus it seems as if the representation or construct of the hare is 'running' in the internal world in a way corresponding to the actual hare in the actual world" writes Sjölander, so that "the sense organs are just used to correct the representational happenings and not to create them" (*ibid*, 3). In the snake, on the contrary, hunting appears to be guided by a succession of quite independent sense modalities. Thus striking of prey is governed by sight (or temperature sense organs); location of the struck prey is detected by smell, and the swallowing procedure is governed by touch. This lack of true intermodality in the snake makes it "hard to imagine that the snake can harbor some form of a concept of a mouse in its brain" (*ibid*, 5). The snake apparently can not integrate its sense modalities to form a central construct.

A moving animal in a moving world is confronted with a perpetual need for making split second choices of behavior. Such choices evidently will serve survival the best if they are based on some kind of anticipatory calculation which integrates inner body parameters such as emotional states, fatigue, hunger, memory into a range of external parameters as registered by the sense organs. As long as the animal has a survival strategy based on simple activity schemes in a predictable space of challenges these behavioral decisions may well be accounted for in terms of instinctive patterns of sensorimotoric reflex circles. Such a direct connection between a stimulus and a corresponding behavioral act is perhaps what takes place in the snake so that in its Umwelt there are indeed no mice, but only things to be searched for, things to be stroked, and things for swallowing. In animals dealing with more complex patterns of challenges, a direct coupling of stimulus and behavior is no longer sufficiently flexible. Instead, the brained body as a holistic intentional unity must now make decisions based on split-second evaluations of unforeseeable events. Judging from the efficiency of modern computer programming in producing virtual realities, there is probably no *a priori* reason why brains could not have solved this problem by a sophisticated elaboration of the reflex circuit principle. But while computers are designed to obey strategies decided by the programmer, organisms had to develop designs obeying their own interests; and this is where the computer analogy may mislead us. Organisms must integrate their life project into their calculatory potential. The body as flesh and blood, therefore, from the very beginning, has to be part of the anticipatory and inventive brain models. We shall suggest this is the reason why nature invented the trick of producing an experienced holistic virtual reality, an internal icon more or less isomorphic in its properties with those parts of the real world that the animal couldn't safely ignore (note 5). The exciting (threatening, attractive, etc.) aspects of the outer world in this way became internalized as inner threats, attractions, etc., thereby assuring the necessary immediate emotional bias in all choices of action. The hard problem was

not just to calculate the path of action but to make sure this path of action was the most relevant given the esoteric life project of the individual animal, and this is the point where the emotional apparatus must be brought to play. The iconic inner experience works as a holistic marker focusing the enormous diversity of calculations upon a single path of action (further discussed in Hoffmeyer 2006, whence the preceding paragraph was taken).

The core of semiotic freedom lies in the gain of *interpretance* it conveys. Interpretance may be defined as *the capacity of a system for responding to signs through the formation of 'meaningful' interpretants*. High interpretance allows a system to "read" many sorts of "cues" in the surroundings and act upon them in ways that, in the given context, must be assumed to serve the proliferation of the system. In general, the prosperity of systems with high interpretance derives from the advantages a system may obtain by scaffolding of its behaviors or its developmental and physiological processes by means of semiotic controls. Semiotic controls widen the space of scaffolding by introducing indirect mechanisms, omens so to say, in addition to ordinary causal effects, fleeing from smoke, for instance, rather than from the pain inflicted upon the organism by the fire itself (the risk of substituting semiotic causality for efficient causality, on the other hand, is that signs, e.g., smoke, may be faked, whereas burns are the real thing, danger). The emergence of higher-order interpretance means that the system or agent acquires the ability to respond suitably to complex cues that might not be noticed or even be noticeable by lower-level systems. Thus, as we saw, mammals, but not reptiles, are generally capable of interpreting the speed and direction of movement of the prey animal as a complex sign telling them where to search for it in case it disappears from view. Contrary to reptiles, mammals seem capable of making a central construct of the prey animal in their minds or Umwelts, and this is an activity of classification or digitalization. As Bateson told us, the alternation between digital and analog processing is the key to emergence of higher level organization: "to get from the *name* to the *name of the name* we must go through the *process* of naming the name" (Bateson 1979, 206). Or, in a biosemiotic terminology, the emergence of higher-order interpretance departs from situated iconic and indexical semiosis (analogical codings) as we find it in reptilian hunting.

Considering the extent to which Bateson's whole thinking turned upon relations between entities (or agents) rather than on the entities themselves, one may wonder why he did not take up the semiotic thinking from Peirce. His famous conceptualization of information as rooted in "differences that make a difference" comes so close to a genuine triadic Peircean sign as to be nearly indistinguishable. While we leave this question for the Bateson scholars to solve, we shall now end this discussion by noting that as soon as we accept the reality of sign processes, of relative being, we also immediately see the deep significance of Bateson's lifelong attempt to determine the pattern that connects… nature and culture. Semiosis is constitutive to both of these realms, evolution and thinking are made up of the same stuff, and the name for this stuff is relative being.

Notes

1. One should perhaps not exclude, that differences might have causal effects *qua* differences in complex chaotic systems, like vortices or typhoons, where shortlived lifelike properties might perhaps be said to arise.
2. Bateson explicitly remarks that he uses these two terms in the sense given to them in Carl Gustav Jung's *Septem Sermones ad Mortuos* (Jung 1967 (1916)), rather than the sense given to them in Jung's later works where archetypes were included in Pleroma.
3. I am grateful to Peter Harries-Jones for having pointed this out.
4. Octopuses may be an exception.
5. John Deely has pointed me to this very apt formulation of the Uexküllian position on neutral aspects of the Umwelt.

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